

REMARKS

The above-identified Office Action dated March 12, 2003 contained a final rejection of claims 1-22. The Applicants have amended claims 1, 2 and 12 to clarify the invention and to correct minor typographical and antecedent basis errors. Claims 1-22 remain pending in this application. The amendments to the claims are intended to place all of the pending claims in condition for allowance, or alternately in better form for consideration on appeal under 37 CFR 1.116. Therefore, it is respectfully requested that the changes to the claims be entered despite the finality of the present rejection.

The Office Action rejected claims 1-22 under 35 U.S.C. § 103(a) as being unpatentable over Prakash et al. (U.S. Patent No. 6,302,507) in view of Nishikori et al. (U.S. Patent No. 5,880,751).

The Applicants respectfully traverse this rejection in light of the amendments to the claims and the arguments below.

Claim 1 of the Applicant's invention recites in part "...a memory device for storing current printhead operating parameters, a **thermal response model** of the printhead assembly and an **ejection history** of the ejection elements that **collectively define** a **dynamic estimate** of the temperature distribution **across a predefined portion** of the printhead assembly..."

Similarly, claims 2 and 12 recite in part "...obtaining a **thermal response model** of the printhead and an **ejection history** of the ink ejection elements that **collectively define** a **dynamic estimate** of the temperature distribution **across a predefined portion** of the printhead and a current printhead operating temperature using a sensor on the printhead..."

In contrast, the cited references, when combined, are missing at least one limitation of the Applicants' claimed invention. It is well settled that when the Examiner evaluates a claim for determining obviousness, all limitations of the claim at issue must be evaluated. If the combination of references do not produce are missing limitations of the Applicant's claimed invention then a prima facie showing of obviousness does **cannot** exist. In Re Evanega, 829 F.2d 1110, 4 USPQ2d 1249 (Fed. Cir. 1987). In Re Fine, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988).

Specifically, Prakash et al. disclose that an "...adjustment or calibration curve is based the [sic] thermal response model of the printhead assembly..." (col. 13, lines 62-63). Next, Nishikori et al. simply disclose "...detecting operating conditions relating to a state of ink ejection from the recording head, detecting temperature

adjacent to the recording head and changing a driving signal for driving the recording head for ejecting ink from the recording head, on the basis of the results of the state detection and the temperature detection.” (see Abstract of Nishikori). Clearly, when these references are combined, they do not teach, suggest or disclose the Applicants’ claimed limitations of a “...**thermal response model...and...ejection history...that collectively define a dynamic estimate** of the temperature distribution **across a predefined portion** of the printhead...”

Although the Examiner alleged that Nishikori et al. disclose “...the history of the ejection state is stored and used to check if the current ejection state is changed or not...”, the Applicants’ respectfully disagree with this interpretation of Nishikori et al. and submit that Nishikori et al. does not disclose using an “ejection history” like the Applicants’ invention. Instead, Nishikori et al. actually and explicitly disclose detecting “...the change of the ejection state ...”, which when combined with Prakash et al., is very different from the Applicants’ claimed obtaining “...**thermal response model...and...ejection history...that collectively define a dynamic estimate** of the temperature distribution **across a predefined portion** of the printhead...”

In fact, “...the change of the ejection state ...” that is detected by Nishikori et al. cannot be compared to the Applicants’ claimed invention because Nishikori et al. is specifically determining a “...change of the ejection state...” which is very different from the Applicants’ claimed “...**ejection history...that collectively define a dynamic estimate** of the temperature distribution **across a predefined portion** of the printhead...”

Thus, even though Nishikori et al. discloses checking an “ejection state” as argued by the Examiner, Nishikori et al. clearly does not disclose an “ejection history” like the Applicants’ claimed invention. The Examiner is reminded that the “...combination of elements...in a manner that reconstructs the applicant's invention only with the benefit of hindsight...is insufficient to present a prima facie case of obviousness.” There must be some reason, suggestion, or motivation found in the references whereby a person of ordinary skill in the field of the invention would make the combination. That knowledge cannot come from the applicant's invention itself. In re Oetiker, 977 F.2d 1443, 24 USPQ 2d 1443, 1446 (Fed. Cir. 1992).

Further, “[T]he genius of invention is often a combination of known elements which in hindsight seems preordained. To prevent hindsight invalidation of patent claims, the law requires some ‘teaching, suggestion or reason’ to combine cited

references." Gambro Lundia AB v. Baxter Healthcare Corp., 110 F.3d 1573, 1579, 42 USPQ 2d 1378, 1383 (Fed. Cir. 1997). When the reference in question seems relatively similar "...the opportunity to judge by hindsight is particularly tempting. Consequently, the tests of whether to combine references need to be applied rigorously." McGinley v. Franklin Sports Inc., 60 USPQ 2d 1001, 1008 (Fed. Cir. 2001). Therefore, since the Examiner has failed to provide an argument and references with all of the Applicant's claimed limitations, the rejection is improper and a prima facie case of obviousness cannot be established. In re Kotzab, 55 USPQ 2d 1313, 1318 (Fed. Cir. 2000). *MPEP 2143*.

With regard to the dependent claims, since they depend from the respective independent claims argued above and contain additional limitations, they are therefore also patentable at least on the same basis (*MPEP* § 2143.03).

As the foregoing amendments to the claims do not raise new issues, it is the Applicants position that they are entitled to have the changes entered to place the claims in condition for allowance, or alternately, in better condition for consideration on appeal under 37 CFR 1.116. It is, therefore, respectfully requested that the changes to the claims be entered despite the finality of the present rejection.

Thus, it is respectfully requested that all of the claims be allowed based on the amendments and arguments. Accordingly, the Examiner is respectfully requested to withdraw the outstanding rejection of the claims and to pass this application to issue. Additionally, in an effort to further the prosecution of the subject application, the Applicants kindly invite the Examiner to telephone the Applicants' attorney at (818) 885-1575 if the Examiner has any questions or concerns. Please note that all correspondence should continue to be directed to:

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Respectfully submitted,
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VERSION WITH MARKINGS TO SHOW CHANGES MADE
IN THE CLAIMS

The following are marked-up versions of claims 1, 2 and 12:

1. (Twice Amended) A temperature control system for an inkjet printhead assembly, comprising:
 - a printhead assembly having ink ejection elements energizable by an electrical pulse having an amplitude and pulse width;
 - a sensor coupled to the printhead assembly for generating a signal representative of the printhead temperature;
 - a memory device for storing current printhead operating parameters, a thermal response model of the printhead assembly and an ejection history of the ejection elements that collectively define[s] a dynamic estimate of the temperature distribution across [the] a predefined portion of the printhead assembly; and
 - a controller for reading a nominal operating pulse width, the signal from the sensor, the dynamic estimate and the printhead operating parameters, [said] the controller calculates an adjusted pulse width using the nominal operating pulse width, the signal from the sensor and the current printhead operating parameters;wherein the controller uses the adjusted pulse width to control printhead temperature.

2. (Twice Amended) A method of controlling the temperature of an inkjet printhead having ink ejection elements, the method comprising:
 - reading a nominal printhead operating temperature;
 - obtaining a thermal response model of the printhead and an ejection history of the ink ejection elements that collectively define[s] a dynamic estimate of the temperature distribution across [the] a predefined portion of the printhead and a current printhead operating temperature using a sensor on the printhead; and
 - controlling the temperature of the printhead using the dynamic estimate and the measured temperature of the printhead.

12. (Once Amended) A method of controlling the temperature of an inkjet printhead having ink ejection elements energizable by an electrical pulse having an amplitude and pulse width, comprising:

reading a nominal printhead operating temperature, a nominal operating pulse width and pulse width calibration data;

obtaining a thermal response model of the printhead and an ejection history of the ink ejection elements that collectively define[s] a dynamic estimate of the temperature distribution across [the] a predefined portion of the printhead and a current printhead operating temperature using a sensor on the printhead;

determining a pulse width adjustment factor based on the pulse width calibration data, the dynamic estimate and the measured temperature of the printhead;

calculating an adjusted operating pulse width based on the pulse width adjustment factor and the nominal operating pulse width; and

applying the adjusted operating pulse width to the printhead to control printhead temperature.